

The NRP POST

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Summer 2011

Final Endeavour Launch Carried Kentucky Space Experiment to Space Station

KSTC, Inc.

Lexington, KY



Space Shuttle Endeavour's 25th and final launch on May 16, 2011 from NASA's Kennedy Space Center in Florida

NASA Research Park partner Kentucky Space (KS) announced May 16 that Space Shuttle Endeavour's final launch carried a unique biomedical experiment as part of the new Exomedicine Institute (EI) founded by KS.

The experiment, called GlioLab, is a joint project between Kentucky Space/EI, led by Morehead State University (MSU) Space Science Center in Kentucky and the GAUSS-Group of Astrodynamics at the "Sapienza" University of Roma. The launch and return of the payload is through KS's strategic partner NanoRacks LLC.

The Exomedicine Institute (www.exomedicine.com) is a private, collaborative R&D enterprise focused on the development and application of new knowledge, technologies and possibilities that emerge from a deeper understanding of the influences of microgravity on the dynamics of living systems, and the rigorous application of these insights to advance medical solutions for the improvement of everyday life for all people.

Kentucky Space cont'd on page 3

Photo by NASA/Tony Gray and Tom Farrar

Moon Express Lunar Lander Takes First Flight

by Doug Messier

Silicon Valley, CA

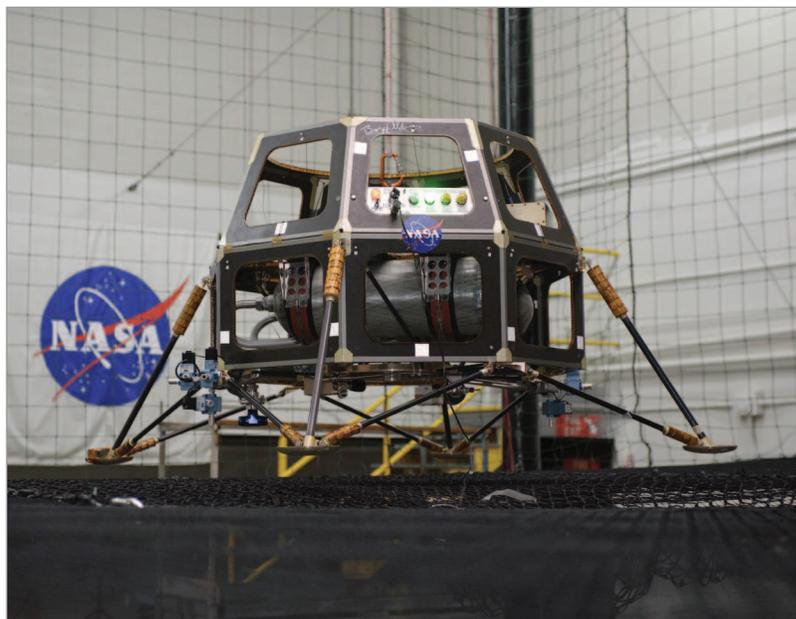
June 30, 2011

NRP's Moon Express, Inc. announced June 30 a successful flight test of a prototype lunar lander system being developed in partnership with NASA.

The company signed a Reimbursable Space Act Agreement with NASA last year to invest over \$500K into the commercialization of technology developed by the agency. The agreement aims to develop new low cost spacecraft to deliver scientific and exploration payloads to the Moon and other destinations.

The flight test marks an important milestone in the collaborative agreement, demonstrating that innovative public-private partnerships can be utilized

Moon Express lander cont'd on page 3



The Landing Test Vehicle (LTV), a prototype robotic lunar lander system, in NASA Ames Hover Test Facility

Photo courtesy of NASA

NRP Welcomes

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AECOM

Bldg. 19, Room 2045

Commencement date: 7/1/11

AECOM is a global provider of professional technical and management support services to the transportation, facilities, environmental, energy, water and government markets. AECOM blends global reach, local knowledge, innovation, and technical excellence in delivering solutions that create, enhance and sustain the world’s built, natural, and social environments. Our architects, engineers, landscape architects, planners, ecologists, economists, program managers, construction managers and technicians work collaboratively to address complex challenges, particularly in support of highly technical facilities projects, at all scales and in all settings.



Global Medical Device Partners, Inc.

Bldg. 19, Room 1071

Commencement date: 8/1/11

GMDP, Inc. is a medical device company whose mission is to support design and development of innovative medical technologies to improve patient quality of life. Key areas of focus include assessment and reduction of muscle loss and function resulting from disease or injury.



Moon Express, Inc.

Bldg. 19, Rooms 1002 - 1006

Commencement date: 4/16/11

Moon Express, Inc. is a privately funded lunar transportation and data services company establishing new avenues for commercial space activities beyond Earth orbit. This company is working alongside NASA Ames scientists to build robotic landing systems for exploration of the Moon and other low gravity destinations.



National Disaster Resiliency Center

Bldg. 19, Rm 2001

Commencement date: 8/15/11

The NDRC is a member of the Disaster Management Initiative operated by CMU-SV. They are collaborating with CMU on the enhancement of emergency management and disaster preparedness, along with collaborative partnerships between researchers, educators, volunteers, vendors, charitable groups, community organizations and leaders, government agencies, businesses and others who would play a role in planning, preparation, response and recovery prior to, during and after any disaster or emergency event.



Kentucky Space cont'd from page 1

The primary objective of the GlioLab experiment is to investigate if the combined effects of microgravity and ionizing radiation increase or decrease the survival rate of cancer cells affected by Glioblastoma multiforme (GBM). Glioblastoma is the most common and aggressive type of primary brain tumor,

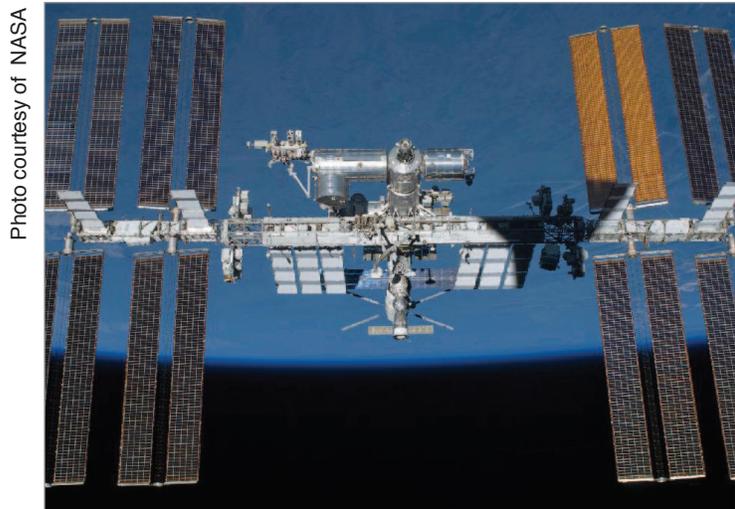


Photo courtesy of NASA

The International Space Station as photographed by a crew member on the shuttle Endeavor.

Moon Express lander cont'd from page 1

to establish new capabilities of mutual benefit to commercial space companies and NASA.

The successful milestone involved a controlled flight test of a Landing Test Vehicle (LTV). The LTV is a prototype robotic lunar lander system outfitted with a cold gas propulsion system and landing gear for use in a confined, ground test environment for relatively easy, quick, and repeatable ground testing. The LTV offers a unique capability to safely perform risk reduction and testing on candidate spacecraft hardware and software in an actual flight environment. The LTV tests allow Moon Express to assess lunar vehicle design, including guidance, navigation and control software and new landing leg and mobility concepts designed by Moon Express engineers. The LTV is also being used to test a new mini-radar sensor developed by Moon Express under NASA's Innovative Lunar Demonstrations Data (ILDD) program.

The company plans to send a series of robotic spacecraft to the Moon for ongoing exploration and commercial development focused on benefits to Earth. "I believe in the long term economic potential of the Moon to produce resources essential to Earth's energy future," said Naveen Jain, Co-Founder and Chairman of Moon Express. "The recent discovery of abundant water on the Moon is the key we needed to economically liberate valuable lunar resources such as Helium-3 and platinum group metals to improve life here on Earth."

Moon Express lander cont'd on page 5

accounting for 52% of all primary brain tumor cases and 20% of all intracranial tumors. Certain cancer cells have been shown to reproduce more slowly in a reduced gravity environment. The team hopes to learn how microgravity affects cellular mitosis and RNA transcription in these cancer cells, which could ultimately lead to a better understanding of how to treat this type of cancer.

This initial phase of the GlioLab experiment exposed the Glioblastoma cell line to microgravity using a commercial platform—the Liquid Mixing Apparatus developed by PA-based Instrumentation Technology Associates, Inc. The experiment spent about two weeks on-orbit and has returned to Earth for analysis in Kentucky.

GlioLab team members include Dr. Ben Malphrus, Director of the MSU Space Science Center, Dr. Darrin DeMoss, MSU Professor of Biology, Chantal Cappalletti and Giacomo Marini, Ph.D. students at the University of Rome who are currently working at MSU. MSU students from the Space Science Center (Julia O'Brien) and the Department of Biology and Chemistry (Cara DeMoss and Will Grey) serve on the science team along with Daniel Erb and Twyman Clements from Kentucky Space.

For more information visit www.kentuckyspace.com

The Google Lunar X Prize, a \$30 Million Private Race to the Moon, Names New Chief

Space science veteran Alexandra Hall will oversee the Google Lunar X Prize as its senior director, the X Prize foundation announced July 11. Hall is the co-founder and former CEO of Airship Ventures, a company that uses zeppelins for passenger flights, science research and media purposes. She also served as executive director of the Chabot Space & Science Center in Oakland, Calif. Hall has a degree in astrophysics from the University of Leicester in the United Kingdom. She has written books about space for both children and adults, and she hosted the BBC Television show "Final Frontier".



Alexandra Hall

Photo by KQED Quest

(From: <http://www.space.com/12240-google-private-moon-race-xprize-director.html>)

World's Fastest EV Prototype Race Car – KleenSpeed's EV-X11 Epic Record Run Reasserts KleenSpeed's EV R&D Leadership

by Dean Seven

KleenSpeed Technologies' sleek EV-X11 shattered the lap record for Electric Vehicles on the Mazda Raceway circuit June 26 at ReFuel 2011. Piloted by KleenSpeed Technologies President Tim Collins, the racecar of tomorrow set a new lap record of 1:38:858 for EVs, breaking the 2010 record of 1:42.5 set by KleenSpeed's prior model, the WX 10.

The sound of the future pierced Laguna Seca hills as the EV-X11 flashed down the front straight at over 120 mph, its eerie high tech whistle bringing the message of a powerful new technology.

"The EV-X11 is a unique thrill to drive and is truly the fastest electric track racing car in the world. A completely new Kleenspeed electric power system with a more powerful UQM electric motor and controller increased our acceleration and overall speed. The new system is more powerful, more sophisticated and lighter. The car was more responsive, had improved braking control and created more G force in the corners adding grip," said Collins.

"The car runs at full throttle and full braking with no heat or power limiting problems, and no performance degradation until it runs out of energy, which is about seven laps or 12 minutes, with our patent pending 15.4 kWh KleenSpeed ESS battery pack. Three years of R&D and tireless effort by our KleenSpeed engineers, advisors and component sponsors produced this car."



Photo courtesy of KleenSpeed

The winning KleenSpeed team and their EV-X11, the racecar of tomorrow. "Dante and the tech team's technology gains over the last year created the electric system power and reliability to break our record again," said KleenSpeed President Tim Collins.

KleenSpeed CTO Dante Zeviar: "The new KleenSpeed Battery Management System (BMS) is the brain of our electric storage solution featuring our patent-pending KleenSpeed Electric Storage Interface and KleenSpeed battery containers. We powered

this car with lithium polymer cells, which substantially reduced weight, gave us more energy density and increased total energy to 15.4 kWh.

"Our power train incorporated a Gate's carbon fiber belt within a KleenSpeed drive system. Our KleenSpeed telemetry technology gave our engineers 20 streams of data monitored

EV-X11 cont'd on page 5

KleenSpeed Miata Claims First!

by Dean Seven

KleenSpeed Technologies demonstrated their world class electric vehicle propulsion engineering with their Miata's first place win in the EV production vehicle conversion class. This is in addition to their outright title of world's fastest EV in the prototype category won by the KleenSpeed EV-X11.

Driven by KleenSpeed president Tim Collins, the Miata won in a diverse field of EV conversions with a lap time of 2:22.972 – over 19 seconds faster than the 2nd place finisher, a converted Porsche 914. This is a remarkably quick time for an EV with the power and capacity specs of the KleenSpeed LITE SYSTEM, considering that the Miata chassis is essentially stock, running on street tires, with no significant track modifications. For comparison, a stock gas-powered Miata typically laps Laguna Seca in the 2:05 -2:10 range.

Tim Collins: "The LITE SYSTEM performed impressively, and offered very steady and controllable power, with no heat issues or power limitation problems. It is an absolutely bullet-proof system and an elegant conversion. The vehicle integration engineering by KleenSpeed balanced the system perfectly."



Photo courtesy of KleenSpeed

The KleenSpeed Miata

EV-X11 cont'd from page 4

Photo courtesy of KleenSpeed



Dante Zeviar and Tim Collins

while the car was in motion from our KleenSpeed BMS and the UQM controller. Thanks to our patent pending Energy Storage System and proprietary BMS with built in telemetry, we know exactly what is going on with our car in real time."

Competition forges the greatest advances in vehicle technology. KleenSpeed is developing an electric racecar for track events to meet the challenges of their definition of overall EV performance— to optimize all relevant EV system factors – acceleration, top speed, range and power management. Legendary Mazda Raceway is one of the world's most challenging circuits for man and machine, with 2.238 sinuous miles, 11 unique turns and considerable elevation changes.

"We are just beginning to assess the EV-X11 potential, as we were running at 65% of maximum torque to set this new record," said Collins. "We look forward to taking the EV-X11 to other famous venues to establish new EV lap records and demonstrate the viability and incredible performance of KleenSpeed's EV technology."



Photo courtesy of KleenSpeed

while the car was in motion from our KleenSpeed BMS and the UQM controller. Thanks to our patent pending Energy Storage System and proprietary BMS with built in

Moon Express cont'd from page 3

Dr. Barney Pell, Co-Founder, CTO and Vice Chairman of Moon Express, believes that exploration and development of lunar resources are two of the most important activities for humanity's future. "The Moon has never been explored before from an entrepreneurial perspective," he said. "I believe the Moon may be the greatest wealth creation opportunity in history. It's not a question of if, just of who and when."

Moon Express plans to adapt NASA's Common Spacecraft Bus for use in small, low cost spacecraft designed to deliver payloads to a variety of locations, including lunar orbit and lunar surface, Low Earth Orbit (LEO), Earth-Moon Lagrange points, and Near Earth Objects (NEOs). The Common Spacecraft Bus design allows the company to design low cost missions, launch on a variety of commercial rockets and deliver flexible payloads to the lunar surface and various orbits.

For Moon Express, the opportunity to commercialize NASA knowledge and technology to create a commercially viable lunar lander system is a force multiplier of its private investment. Small spacecraft missions promise great value given their significantly lower cost structure, rapid development and deployment schedules, resulting in more frequent missions within a set budget and time frame compared to the status quo. The Moon Express partnership agreement with NASA is consistent with initiatives to embrace commercial entities to help move the whole industry forward.

The company views NASA's partnership as exemplary of a commitment to help nurture the burgeoning commercial spacecraft industry. Under the agreement, Moon Express is reimbursing NASA for technical assistance interpreting NASA designs of the Common Spacecraft Bus for applicability to the company's new lunar vehicle design and in the evaluation and testing of new spacecraft systems and software in a newly refitted hover test facility.

Following the successful flight test, Moon Express CEO Dr. Robert (Bob) Richards stated that White House policies supporting NASA's openness to commercial partnerships combined with Silicon Valley culture has been a winning combination for the company. "Locating the company in the NASA Research Park puts us at the crossroads of the future," Richards said. "Silicon Valley has embraced commercial space and Moon Express is benefiting greatly by our proximity to the NASA Ames Research Center."



Chrysler executives visited NRP on June 16, 2011. NRP Director Michael Marlaire gave an extensive briefing on the NRP followed by a tour.



Representatives from Lawrence Livermore National Lab (LLNL) toured a number of NRP partner facilities and finished with a tour of NASA Sustainability Base led by NASA Ames Associate Director Dr. Steve Zornetzer with NASA HQ Director for Partnerships Doug Comstock.

Hundreds Participate in Second Annual Carnegie Mellon University Silicon Valley Disaster Management Initiative Workshop & Mobile Command Center Vehicle Rally May 22-23

by Sylvia Leong, Director of External Relations and Admissions, Carnegie Mellon Silicon Valley

The little kid in all of us became excited when we caught a glimpse of the large vehicles in the parking lot. Even though their sirens weren't wailing, the chance to see the state-of-the-art equipment they contained piqued our interest.

Sponsored by California Fire Chiefs Association (CFCA), California Emergency Management Agency (CalEMA), Carnegie Mellon University Silicon

Valley (CMUSV), and hosted by NASA Research Park, the Second Annual CMUSV Disaster Management Initiative (DMI) Workshop, held jointly with the California Mobile Command Center (MCC) Vehicle Rally, saw first responders, technologists, volunteers, and government officials descend upon the CMUSV campus to learn about new innovations and collaboration for the work they perform every day.

The action-packed two day workshop featured keynote speakers and expert-filled panels covering public and private partnerships, emergency communications at a large-scale festivals, and how to involve volunteers in disaster management collaborations. The first keynote speaker, Major General Scott Johnson, shared personal reflections on his deployment in response to Hurricane Katrina. He offered difficult lessons learned and discussed the specific role of the 40th Infantry Division of the California National Guard, which he commands.

At the end of MG Johnson's talk, several government representatives stopped by to show their interest in and support for the workshop. Guests included California Assemblymember Paul Fong; Charles Duff, Deputy Director of NASA Ames Research Center; Sandra Soto, representing Congresswoman Zoe Lofgren's office; Steve Rice, Vice Mayor of Los Gatos, CA and Jac Siegel, Mayor of Mountain View, CA.

Two additional keynote talks were well received. Joseph Pred, Emergency Services Operations Chief for Burning Man, detailed the logistical and technical challenges and solutions involved with setting up temporary communications infrastructure for a short lived city of 50,000 in the middle of

the desert. Of particular note is that federal, state and local agencies have begun studying the Burning Man festival environment for lessons learned that can apply to disaster and other temporary organizational infrastructure at scale.

Photo by Orange Photography



Mobile comand centers and emergency response vehicles at CMUSV DMI Workshop & MCC Vehicle Rally

Michael Cummings, Federal Emergency Management Agency (FEMA) Region IX Private Sector Liaison, led another panel discussion, "Public/Private Partnerships – What's in it for Me", highlighting best practice case studies in emerging technologies. This keynote was particularly remarkable

due to the panelists involved: Doug Wisman, CalEMA; Jim Turner, City & County of San Francisco Private Sector Liaison; Catherine Nelson, Cisco; Peter Ohtaki, California Resiliency Agency and Martin Griss, Director, CMUSV. The panel represented federal, state, county, corporate, non-government organization, and academic sectors. Their contributions provided much insight to public and private partnerships and how one can benefit from the other in disaster management.

This was not your average speaker and audience workshop, but was also hands-on – including vehicle lot demos with opportunities to tour the mobile command centers that participated in the rally and disaster communications exercises. Of particular interest to many attendees was the Cisco Network Emergency Response Vehicle (NERV), which is often deployed in collaboration with CalEMA. Cisco NERV is a self-powered mobile communications center that can be fully operational in 15 minutes, while disaster response readiness can take up to 72 hours.

Another participant at the MCC rally is a permanent resident



Photo by Orange Photography

Next Generation Emergency Operations Center

NASA Ames Celebrates Asian Pacific Islander Heritage Month



NASA Ames celebrated Asian Pacific Islander Heritage Month on May 27 at Michael's Restaurant in Mt. View. Over 100 employees enjoyed a flavorful lunch while watching a vibrant cultural fashion show that highlighted traditional costumes from Asia and the Pacific Islands modeled by Ames and NRP employees. Shown in the group photo are several NRP staff members: Mejghan Haider, NRP Deputy Chief, (Afghanistan); Sally Tateno (Japan); Cyndi Carbon-Norman (MC) and CMU partner Theresa Dao (Vietnam).

Disaster workshop cont'd from page 6

at CMUSV, the Next Generation Emergency Operations Center (EOC), demonstrated by Art Botterell, consultant with DMI. With 18 foot trailers provided by NASA Ames Disaster Assistance and Rescue Team (DART), this evolving EOC is being equipped with low energy, solar powered IT and communications technology, and connected via WiFi and other radio technology to other disaster management research systems at CMUSV.

Steve Ray, associate director of the DMI, conducted a Plugfest coordinating the communication between over 30 mobile command center vehicles. The exercise was designed to test the interoperability of the vehicles and their ability to communicate with each other, pass data along to other vehicles and coordinate efforts between different types of communications systems.

Even novice attendees absorbed some awareness with a session on personal emergency preparedness. The detailed course is typically given at the community level



CMUSV DMI staff and local experts/officials at the DMI Workshop

to enable families to plan in advance for disasters, but workshop attendees were offered a condensed version. Topics included home and workplace preparedness, life-threatening conditions, disaster impact, fire safety and hazardous materials. Of particular note are useful websites on emergency preparedness: www.fema.gov/areyouready and <http://72hours.org/>.

Several CMUSV faculty led sessions on their research in a variety of topics, including sensors, machine learning, and antenna optimization. These sessions showed how their research is currently being applied to disaster response situations. One session held by Assistant Professor Ian Lane led participants in a hands-on workshop on parsing audio-to-text using sample twitter messages.

"This workshop was all about breaking down the silos. Practitioners, policy makers and researchers talking to each other, seeing each other's presentations and demos – coming together to share and learn from each other – that was what the Workshop was about for me," said Steven Rosenberg, associate director of CMUSV.

Martin Griss, director of CMUSV, said, "I thought the event exceeded our expectations. We had a great turnout, there was great energy and excitement, and many people commented that bringing practitioners, companies, academics, vehicles and technology together for an intensive set of discussions, workshops, exercises and interoperability was a unique experience."

Toward the end of the event ideas were already buzzing for next year's workshop, which promises to be even bigger and better.

FutureMed Executive Program A First at Singularity University

by Robin Farmanfarmaian

FutureMed is a first of its kind medical program at Singularity University for physicians, healthcare executives, innovators and investors. Seventy attendees and over 60 faculty speakers came to the inaugural FutureMed during the week of May 10th-15th to explore the impact of rapidly developing technologies on the future of health and biomedicine.

Photo courtesy of FutureMed



(From left to right) Andrew Hessel, Astronaut Dan Barry MD, FutureMed Executive Director Daniel Kraft MD and Singularity University President Neil Jacobstein during the synthesis session May 15th

Few fields have the potential to evolve more dramatically through disruptive, exponential technologies than healthcare. Low cost genomic sequencing and proteomics, ever faster and higher resolution imaging, artificial intelligence, telemedicine, stem cells, robotic surgery, smaller and more capable implantable and wearable devices, ubiquitous mobile applications, nanotechnology and synthetic biology -- these and other game-changing technologies and innovations have tremendous implications for the medicine, healthcare and the biomedical industry in the decade ahead, including the potential enablement of better, more accessible care at lower costs.

The five-day intensive FutureMed program included lectures, workshops and site visits to Autodesk, Intuitive Surgical and Kaiser Garfield Innovation Center. Two of the more popular demos featured included Vasper at NASA that many of the participants tried and the DMAST Anti-Shock Garment that uses NASA technology.

All lectures, demos and site visits were led by notable faculty from the fields of medicine, biotechnology and innovation. "We're fortunate to have at FutureMed truly world-class innovators and thought leading faculty, across multiple disciplines," said Executive Director Dr. Daniel Kraft, a Stanford and Harvard trained physician-scientist who also chairs the Medicine track for Singularity University.

Core tracks included those which explore the exponential trends in Information/Data-driven and Internet enabled

health care, Genomics and Personalized Medicine, Regenerative Medicine, Robotics & Future Interventional approaches, NeuroMedicine, Device & Drug development, and Entrepreneurship.

Over 60 FutureMed faculty came from across the globe, here is a small sampling. The full list can be found on the FutureMed website: <http://futuremed2011.com/faculty/>

- Peter Diamandis MD, Chairman of the X-PRIZE and Co-Founder of Singularity University
- Dan Barry MD PhD, 3 time Space Shuttle NASA Astronaut and Robotist
- Yvonne Cagle MD, NASA Astronaut
- Dr. John Hogan, Bioengineering Branch at NASA Ames Research Center
- Tim O'Reilly, Founder and CEO of O'Reilly Media
- Dean Ornish MD, Founder and President, Preventative Medicine Research Institute
- Thomas Goetz MPH, Executive Editor WIRED, Author of 'The Decision Tree'
- Catherine Mohr MD, Director of Medical Research, Intuitive Surgical
- David Ewing Duncan, Author of 'Experimental Man,' and the 'Personalized Medicine Manifesto'
- Randy Scott PhD, Founder and Chairman of Genomic Health
- Roni Zeiger MD, Chief Health Strategist, Google
- Christopher Longhurst MD, Chief Information Officer for Packard Children's Hospital, Stanford Medical School
- Michael Gillam MD, Director of the Microsoft Medical Media at Microsoft Health
- Allan May, CEO of Life Sciences Angels
- Michael West PhD, Founder of Geron and BioTime Pharmaceuticals



Participants and faculty pose in the special FutureMed scrubs outside Building 583C at NRP

Photo courtesy of FutureMed

NRP's Packing for Mars Lecture Fills the House

by Kathleen Burton

A standing room only crowd jammed the Bldg. 3 Ballroom on May 3 to hear Dr. Pascal Lee and author Mary Roach team up for a conversation about what it takes to go to Mars.

Subtitled "The Challenges and Oddities of a Human Mission to Mars", the informal conversation, complete with Tiffany lamp and comfortable armchairs, ranged from the haunting beauty

of Mars and the health and psychological risks of long duration exploration, to the day-to-day, not-so-great details like going weeks without a proper shower in a confined space capsule.

Roach, author of the recent best seller "Packing for Mars: The Curious Science of Life in the Void", and called "America's funniest science writer" by the



Author Mary Roach and Dr. Pascal Lee

Washington Post, did not dwell on the awe-inspiring grandeur of space exploration, but focused instead on the human side of space travel.

She outlined some of the past unorthodox ideas for survival in space—such as sending obese astronauts to Mars so they could live off their stored body fat and save substantial food payload weight. She noted that space travel makes teeth rot and astronauts taller (spines stretch in space). Astronauts are as much as 2.5 inches taller after a week in space, she noted. The typical gain is 3% of an astronaut's height due to expansion of the discs between the vertebra, which also absorb more water in micro-G.

As a highlight, Roach read an excerpt from "Packing for Mars" about lunch at the Ames Cafeteria, about the experience of drinking treated (and safe) urine which had been stored in the Ames cafeteria refrigerator, with her lunch date, Sherwin Gormly. Gormly, a NASA waste water engineer, designed the mechanical rig that recycles urine on the Space Station. "I thought the cafeteria check-out person was going to call Security (when we came through with the bottle)," she said.

Lee, from the other armchair, focused on the "beauty and harshness" of Mars as he showed stunning slides of the red planet's canyons and of a recent summer field season at his

Mars-on-Earth analog, Haughton Crater in the Canadian Arctic. At Haughton, teams of scientists test space suits, rovers, robots and the psychology of isolation.

"Mars is mostly all rocks and dunes," Lee noted. One of the biggest dangers about going to Mars he said is the relentless stinging sand, which blows constantly and gums up machinery and robots. A basic mission would require astronauts to spend at least 540 days on Mars, before returning to Earth, he said, with daunting psychological and health challenges such as isolation, radiation and severe and rapid bone loss.

In spite of today's risk-averse culture, 21st Century humans want to go to Mars for three reasons, Lee, Roach and MC Dr. Chris McKay, agreed: for the journey, for science, and to find extant life.

There was lots of lively interaction with the enthusiastic audience. The discussion included what it takes to get an entire nation motivated about going to Mars, even with today's steep \$500 billion price tag (which is notably, the cost of the Iraq war to-date). "It's like when the U.S. went full boar into exploring the Moon in the 1960's," McKay said. "It was a race with Russia back then, a challenge. We need a similar challenge now because the political climate is obviously very different."

The three also floated the controversial idea of a one way Mars mission, where astronauts would not return to Earth, but would live out their lives there. Lee and McKay outlined the idea of an incremental path to Mars, space hop-scotching first to the Moon or to Phobos and Deimos, the moons of Mars, to stock-pile resources before continuing on to Mars. The path to Mars will be in small, incremental steps, they agreed. "A Mars orbiter will surely proceed a Mars lander," Lee noted.

Previous books by Roach include "Stiff: The Curious Lives of Human Cadavers" and "Spook: Science Tackles the Afterlife".

McKay is a planetary scientist with the Space Science division at Ames and is one of the world's leading researchers, studying Jupiter's moon, Titan, and conducting numerical modeling of planetary atmospheres.

Lee is a planetary scientist at the SETI Institute, is Chairman of the Mars Institute at the NRP, and Director of the Haughton-Mars Project (HMP). HMP is an international interdisciplinary field research project centered on the scientific study of the Haughton impact structure and surrounding terrain, at Devon Island in the High Arctic. The rocky polar desert setting and geologic features of the site offer unique insights into the possible evolution of Mars and the limits of life in extreme environments.

For information on HMP: <http://www.marsonearth.org>
For information on Mary Roach: <http://www.maryroach.net>
For information on the NRP Exploration Lecture Series: <http://researchpark.arc.nasa.gov>

First Tenant of NASA Research Park Now Thriving Social Enterprise Benetech Celebrates More Than 20 Years of Developing Technology For Humanity

by Ann Harrison

In 1999 a small, nonprofit organization named Arkenstone became the very first tenant of the newly launched NASA Research Park. Arkenstone's founder, Jim Fruchterman, had developed a reading machine for the blind using a new kind of optical character recognition technology. Not only was Arkenstone's technology innovative, its business model was also unique. Jim formed Arkenstone as a social enterprise which adapted existing technology and developed low-cost solutions to solve pressing social problems. His goal was to bring the benefits of technology to all members of society, including people who are marginalized or especially in need.

Photo courtesy of Benetech



Jim Fruchterman

More than ten years later, Jim's pioneering social enterprise is still thriving. Two years after Arkenstone moved to NRP, a for-profit company named Freedom Scientific made an offer to buy the Arkenstone business. Fruchterman sold the business and used the proceeds to launch Benetech, the successor social enterprise that carried forward Arkenstone's goal to create technology that serves humanity. In 2006,

Jim was named a MacArthur Fellow for his role as a pioneering social entrepreneur.

Today Benetech is a thriving \$12 million nonprofit with 55 employees based in Palo Alto. It generates revenue from the sales of its products, government grants and funding from individual philanthropists and foundations. The Benetech team and their projects have had a wide impact on underserved communities around the world. Benetech's Bookshare project is now the world's largest online library of accessible ebooks for people with a disability that keeps them from reading standard print. Bookshare now has more than 140,000 members with print disabilities who depend on the library for textbooks and recreational reading. The collection of texts has expanded to include over 100,000 books, many of which are provided for free to Bookshare by top publishers.

In 2007, Bookshare received a five-year award from the U.S. Department of Education, Office of Special Education Programs (OSEP), to provide free access to books for all U.S. students with a qualifying print disability. Last spring, Benetech won a \$5 million competition to create the DIAGRAM R&D center that will find new ways to provide accessible images for

people with print disabilities.

Benetech also supports a Human Rights Program which includes the Human Rights Data Analysis Group that designs and builds informa-

tion management solutions and conducts statistical analysis on behalf of human rights projects. Together with partners, the scientists of HRDAG make scientifically-defensible arguments about the patterns of violence based in rigorous evidence. Benetech also developed the free and open source Martus software which allows users to create a searchable and encrypted database and back this data up remotely to their choice of publicly available servers. The Martus software is used by organizations around the world to protect sensitive information and shield the identity of victims or witnesses who provide testimony on human rights abuses.

The Benetech development team has also created Miradi, a conservation project management software tool. The open source Miradi software program is a joint venture between Benetech and the Conservation Measures Partnership (CMP) a consortium of conservation NGOs. Miradi helps conservation planners to design, manage, monitor, and learn from their



Bookshare program provides ebooks for students with print disabilities

Photo courtesy of Benetech



Conservation planners can manage their projects using Benetech's Miradi software program.

Photo courtesy of Benetech

projects to more effectively meet their conservation goals. Miradi now has more than 3,500 users in over 140 countries.

From its beginnings at NRP, Benetech has expanded to become an engine of sustainable social change. The company is now helping to guide other social enterprises to scale new ideas that deliver far greater social impact at the same or lower cost than status quo solutions. NRP was the place where Benetech began.

Intrinsyx Technologies Provides New Advanced Visual Collaboration (AVC) Solutions

by Yogesh Khare and Mike Schultz

Intrinsyx Technologies Corporation, a NASA Research Park resident that has provided systems engineering, software development and IT solutions to NASA for over 11 years, now also provides the latest generation of ultra-HD, real-time video and graphics sharing systems that transmit data over IP Networks.

Intrinsyx invites you to visit their Advanced Visual Collaboration Showcase at NASA Research Park, Building 19, Suite 2028, in Moffett Field, CA. See their Enhanced Mission Record and Review System (EMRRS) that enables globally distributed teams to collaborate and share mission critical events in real-time over standard data networks.

The Intrinsyx AVC system is a complete hardware and software solution that offers real-time streaming, recording, relaying, and distribution of ultra HD video and graphics over IP networks. The system's video and graphics encoders/decoders deliver exact pixel-for-pixel quality at full monitor rates to remote locations with very low latency (1-2 frames) over standard data networks.

What is unique about the Intrinsyx Advanced Visual Collaboration solution?

- Up to 4-megapixel ultra HD video (up to 2560 x 1600 or 3840 x 1200 resolution) support per encoder channel
- Low latency (1-2 frames encode/decode) at full monitor refresh frame rates over IP networks
- Hardware and Software decoders for secure remote access from multiple locations.
- DMS (digital media servers) capable of recording up to 50 discrete full-res HD streams per device, with time stamp and exact frame sync

- Real-time playback with original video source quality and the ability to scale video bandwidth based on destination network limitations.
- Real-time PVR and synchronized playback of all live and recorded streams with bookmarks and annotation
- XMPP-based real-time presence and policy-based secure software architecture for managing sources and secure distribution of video streams
- Ability to integrate and capture standards-based MPEG, H.264 based Cameras and video encoders
- Real-time remote desktop/workstation control over IP networks

The Digital Media Servers (DMSs) used in the Intrinsyx AVC solutions allow multiple video streams to be stored during a live session. The DMSs also allow secure playback/review of these recorded streams for briefing/debriefing from any location over IP networks. The accompanying windows-based software client offers playback of multiple live or recorded streams that can be viewed on single or multiple displays, with the ability to bookmark and annotate during live or post-action review sessions.

Intrinsyx AVC solutions include web-based tools and management server software to configure and manage an entire AVC system remotely over IP.

Where are the Intrinsyx AVC products used today?

The AVC systems available through Intrinsyx have had success in the defense, medical, and oil & gas exploration market segments. The systems have been deployed in flight simulators, virtual warfare centers, mission command and control centers, cardio-surgical theaters and telemedicine stations and offshore oil & gas exploration stations.

Call: (408) 888-3855 or email: yogesh@intrinsyx.com to set up a time to visit the Intrinsyx AVC Showcase.



Photos courtesy of Intrinsyx

Video wall and remote-user laptop client demonstrated in the Intrinsyx AVC Showcase.

Pete Conrad Spirit of Innovation Award Winners 2011 Teens Invent One-of-a-Kind Products, Address Tech Challenges

by Conrad Foundation
Moffett Field, CA
May 2, 2011

Demonstrating they had the most unique approaches to solving real world challenges in aerospace, clean energy and cyber security, the winners of the Conrad Foundation's 2011 Innovation Summit were announced May 2 at the conclusion of the four-day event at NASA Research Park.

The annual innovation program encourages high school students from across the country to solve challenges of the 21st century by creating breakthrough technologies using science, technology, engineering, and math knowledge and skills.

The grand prize winners taking home the coveted title of 2011 Pete Conrad Scholars, sponsored by Lockheed Martin Corporation, were:

- Ouroboros, Upper Clair High School, (aerospace exploration)—for their Perpetual Harvest Space Nutrition System that takes organic waste created during long duration space flight and creates compost that is used to grow fresh foods, also serving as an air filter for human habitation.

- West Philly EVX Team, West Philadelphia High School Auto Academy, West Philadelphia, PA (clean energy) – their Electric Very Light Car (EVLC) is being prepared for commercial market and hopes to set the standard for electric vehicle efficiency.

- Unisecurity, North Carolina School of Science & Mathematics, Durham, NC (cyber security) – for their Med PAL smartphone application that works with a Bluetooth enabled heart rate monitor worn by the user. MedPAL will automatically contact a call center and/or personal emergency contacts based on GPS coordinates should irregularities occur.

Each winning team received a \$5,000 Next Step Grant to continue development of their product. The teams also receive assistance promoting their product in the media, and at partner events and activities.

In addition to the funding and product support, each team member receives a one-year student membership in American Institute of Aeronautics and Astronautics and a one-year affiliate membership to Sigma Xi, the Scientific Research Society. The

team coach receives a \$500 stipend via the AIAA Coaches Award.



Photo courtesy of Conrad Foundation

S. Pete Worden, Ames Center Director (left); Nancy Conrad, Conrad Foundation Chairman and CEO (center); and the Ouroboros team from Upper Clair High School

“By providing an outlet for students to use their knowledge in relevant and practical ways and by connecting them with mentors who can help make their vision a reality, we open avenues for discovery and build interest in the careers available in STEM industries,” said Nancy Conrad, Conrad Foundation chairman and CEO.

“You represent the future and you are an inspiration to us all at NASA.” said NASA Ames Director Pete Worden at the closing ceremony.

The People’s Choice Award was bestowed on the team with the most votes cast during the online, public voting period. This year’s winner, Scientifica White Hats, from Northern High School in Durham, NC, received the \$500 prize for their Phone Guard all-in-one mastersecuritysystem for smartphones.

Each of the 27 finalist teams created a technical report, a business plan and a graphical representation for their product. The winning teams were selected by a panel of judges made up of top-level academia and industry representatives, with input from public voting at www.conradawards.org.

After the event, all teams have the opportunity to raise additional funds to facilitate the continued commercial development of their projects. Visitors to the teams’ profile pages have the opportunity to donate directly to the development of their favorite team’s project, or they can donate to the team’s sponsoring school, helping continue excellence in science and technology education. Information about each team can be found on the Pete Conrad Spirit of Innovation Awards official Web site: www.conradawards.org.

In addition to Pete Worden, director, NASA Ames Research Center, the teams were joined by notable leaders such as; Adam Savage, MythBusters Co-host; Brynn Watson, Director, Software Engineering, Lockheed Martin Space Systems Company; Ed Lu, Former Astronaut, Former Head of Google Advanced Projects; and Jon Fougner, Principal, Product Marketing Monetization at Facebook.

Wish You Were Here... Postcard from the Zeppelin!

by Rachel Loya

NASA Research Park and NASA personnel may have noticed the absence of the Zeppelin "Eureka" since the start of April. She left on a six month tour of the USA on April 5 and is now officially on the Farmers "Covering Communities" Tour. Barnstorming the world's largest airship across the US is no mean feat, and the on-the-road team averages around 22 people, with two mast trucks and numerous ground support vehicles!

Of course we've had all those tornados and storms to deal with, and that got us stuck outside New Orleans waiting for the worst to pass. We've since been through Florida and up the East Coast, flying over the Big Apple and making a stop to honor the past at NAS Lakehurst. We celebrated July 4 in Chicago (The Windy City!) and at the end of July were at the EAA AirVenture at Oshkosh, inspiring kids of all ages. The full schedule of the tour is at www.farmersairship.com

Aside from covering Farmers events such as golf, NASCAR and charitable flights, Eureka is flying passengers in most of the locations we are stopping. We are also managing to do some special mission work too, testing some new cameras and detectors as well as doing some pilot training. We also just finished our tests of a new LIDAR system that we look forward to



Photo courtesy of Airship Ventures

June 6, 2011 our airship became the first Zeppelin to sail the New York City skies since the Hindenburg more than 70 years earlier. We also made a special flight to Lakehurst Naval Air Station, where the Hindenburg made its final "landing." While there we hovered over the memorial marking the site of where the ship went down.

offering on a regular basis once we return to Moffett in October. Inquiries should go to specialmissions@airshipventures.com.

Speaking of our return, now is the time to think about booking your fall or holiday season 2011 flight aboard "Eureka" if you haven't already. We continue to have specials for locals and our flights are starting to fill up. Send inquiries to reservations@airshipventures.com and, in the meantime, know we're also thinking about a 'welcome back' event so watch for more details!

Taksha University – The Opening Months

by Ravi Deepak

Taksha University (TU) offers technical short-courses (6-18 hours) that aid workforce development and capacity building in a variety of subject areas. Courses are taught by renowned educators and research experts. Since opening our NRP Silicon Valley office in Feb. 2011, we have hosted local courses. In March, Dr. Don Edberg taught a 3-day course on Spacecraft Design in San Jose to a class from around the country. In May, Dr. Ben Herman presented a smaller 2-day course on Atmospheric Radiation at NRP. Both courses, and more on atmospheric/space science, are currently offered on the east coast and in Albuquerque, NM. See www.taksha.org for more information.

Last Fall 2010, in cooperation with Science and Technology Corporation (STC), TU helped manage six student intern

research projects at Ames under the Science and Technology International Education Program (STIEP, www.STIEP.org). It was STIEP's first class at NASA Ames in its 17 years of sponsoring interns at other US research labs. This Fall STIEP will sponsor more students from Technical University, Delft-NL here. For more research opportunities, please contact ravi@taksha.org.

Upcoming Taksha courses:

TRS122: Introduction to Spacecraft Design and System Engineering – Dr. Don Edberg

- August 17-19, 2011: Newport News, VA
- September 14-16, 2011: COSMIAC, Albuquerque, NM
- December 14-16, 2011: Greenbelt, MD

TRS101: Fundamentals of Atmospheric Radiation -- Dr. Ben Herman

- October 2011: Greenbelt, MD
- November 2011: Hampton Roads, VA



Ames Center Director S. Pete Worden (center) with KleenSpeed Technologies' President Tim Collins (right) and CTO Dante Zeviar (left) at the Director's Dinner held May 7 at NASA Ames Conference Center.



A dozen leaders of EPA Region 9 in San Francisco were briefed by NRP Director Michael Marlaire and given a tour of various NRP partners.



Former Secretary of Defense William Perry (second from left) toured NRP Partner Skytran with CEO Jerry Sanders (left) and Dr. Robert Baersh (right), joined by NASA Ames Acting Deputy Chuck Duff.

Five9 Network Systems Collaborates with Fusion-io to Deliver 2.1 Million Input/Output Operations per Second in a 20 Terabyte Memory in Slim 3.5 inch Appliance

by Laleh Mohseni, Five9 NS, edited by K. Burton

NRP Tenant Five9 Network Systems has announced a collaboration with Salt Lake City-based Fusion-io, pioneer of a next generation storage memory platform, for high-density placement of Fusion io's drive technology in Five9 NS's systems.

Five9NS designs server, software, storage and networking products with lifecycles that meet the exacting requirements of Original Equipment Manufacturer (OEM) customers in key vertical industries including energy, government, healthcare, printing and telecommunications.

Now, the Five9 NS "S" series computer platform, integrated with Fusion's ioDrive, ioDrive Duo and ioDrive Octal technology, is available to Five9NS OEM channels. This new series meets the requirements of OEMs, Value-added Resellers and Independent Software Vendors dependent upon extreme applications performance for competitive differentiation, the companies say.

The Five9NS "S" series platforms will now deliver up to 20 terabytes of data, in a slim 3.5 inch high rack mountable package, delivering as much as 2.1 million Input/Output operations per second with a choice of Fusion's ioDrive, ioDrive Duo or ioDrive Octal systems.

The benefits of the speedy new system are increased data center efficiency, reduced operational cost by reducing expensive storage infrastructure and reduced power and cooling expenses, noted Five9 NS CEO Souheil Saliba.

"Fusion-io is pleased to work with strategic Alliance Members like Five9 NS to offer customers appliances that can be tailored to suit the needs of their individual organizations, while at the same time increasing the reliability and efficiency of their IT infrastructure," said Jim Dawson, EVP Sales for Fusion-io. "We believe that the high-performance, low latency "S" series systems bring flexibility, scalability and reduced capital and operational expenditures to enterprise organizations to meet increasingly demanding needs, while working within their IT budgets."

Fusion-io is a provider of system, application and database acceleration, allowing companies to rethink the way they architect their data systems.

At NRP—With reQall Rover, Your Phone as Personal Secretary

by Kevin C. Tofel

Each day I have the same morning routine: The alarm sounds; I reach over to shut it off, and then I grab my smartphone. Before even jumping out of bed, I'll likely spend 15 – 20 minutes with my handset, checking app after app to see what happened while I was sleeping and what's going to happen as the day progresses. A tap here for the e-mail queue to see what's important and actionable. A tap there for the calendar and appointments for today. Another tap, tap, tap for the weather, Twitter messages and maybe the traffic if I'm planning to venture into town. Sound familiar? If it does, then listen to the sound I heard from my handset this morning: it's a new Android app called reQall Rover that's meant to turn your smartphone into an intelligent information assistant.

Hello Personal Assistant

reQall Rover, currently in private beta, is the newest software from the folks behind reQall, a natural language memo service spun off from MIT's Media Lab, that helps manage personal information. And in under 90 seconds, it just told me some key data about my upcoming day. The weather helps me choose my clothes. I know what my first appointment is, understand what my email queue is like, and I learned that a Facebook friend takes photos of popcorn showers. OK, so maybe that last bit isn't important, but you get the idea. This Voice Summary feature is available on demand with a button tap or can be scheduled up to three times per day in the software.

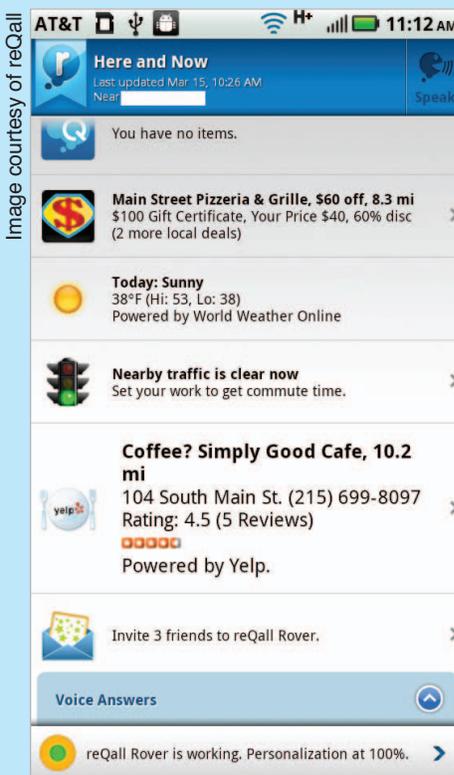
I've been using the software for nearly a week, and I can already see huge potential because it aggregates important data from the various web services I already use. That may be the best description of how reQall Rover works: combining natural language processing with APIs from third-party services, it delivers personalized information to keep me on track, ranging from upcoming appointments, action items, local trending terms on Twitter, traffic nearby, and more. Upcoming appointments generate information on meeting attendees through LinkedIn and other sources. You can also speak to the software to ask questions as it builds up a database of web links and user-generated answers.

Essentially, reQall Rover is bringing important, personal information to me, instead of me having to open app after app just to get the data I need. In that regard, it shares similarities to Siri, Vlingo and Zazu, all of which are trying to sift through personalized data and bring us relevant information. Given all the data on our smartphones and in the cloud, shouldn't we expect that from our handsets? Indeed, why haven't we already seen our smartphones become more efficient assistants?

New Technology Enablers

For that answer, I turned to Don Norman, a twice-retired consultant on human-centered design interaction, book author of "The Design of Everyday Things" and the "Chief Mentor" to reQall. In a phone conversation, he explained that we finally have three key elements that will enable such solutions:

Today we have advanced micro-processors and memory that offer computing capabilities we could only dream of 30 or 40 years ago. We also have fast communications networks so that we can offload heavier processing to the cloud. And finally, we have artificial intelligence and natural language abilities that can put all of the information together. We haven't seen prior solutions such as reQall Rover due to two constraints. These advances



The reQall Rover aggregates data from websites you use for easier access

are all relatively new in terms of hardware; it simply wasn't possible before. Most importantly, two types of knowledge are needed: technology and psychology, which is a rare combination. The technology has advanced, but we're only now pairing it with the understanding of what information people need and how they track their day.

So how does all of this technology come together to make a smartphone smarter? As I alluded to before, it's all in the APIs from services I'm already using. Google knows who and what is important to me based on Gmail and my Google Calendar. My phone knows where I am, so reQall Rover can sift through local information such as Yelp recommendations, nearby Dealmap or Groupon deals, Google Map traffic issues, and where to find the best cup of coffee, no matter where I am and in any weather. Indeed, the more you connect to reQall Rover, the more it learns about you and the better it can assist.

Moon Express Announces Dr. Alan Stern as Chief Scientist

by Daven Maharaj
Mountain View, CA
July 21, 2011

Moon Express, a Google Lunar X PRIZE contender, announced July 21 that internationally recognized planetary scientist Dr. Alan Stern will be the Chief Scientist and Mission Architect for the company. The announcement was made as lunar scientists from around the world gathered at NASA Research Park for their annual Lunar Science Forum, convened by the NASA Lunar Science Institute.

Dr. Stern is the former NASA Associate Administrator for Science and an outspoken advocate for commercial space who believes in the power of private enterprise to complement government efforts. While at NASA he presided over \$4.5B of planetary science, astrophysics, heliophysics, and earth science missions while also serving as the Principle Investigator of the agency's New Horizon's mission to Pluto. "I am thrilled to be working with the Moon Express team as Chief Scientist," he said. "Moon Express has the business model, talent, and the resources to blaze a commercial trail to the Moon and revolutionize the way we do lunar science and exploration. The lunar future is bright."

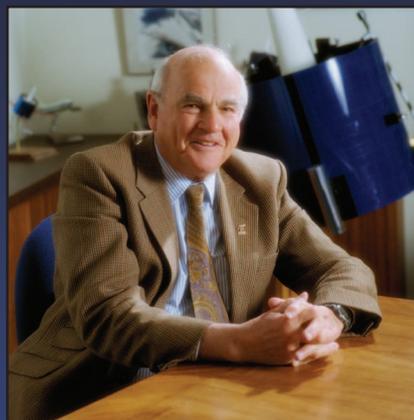
Named by Time Magazine as one of the world's most influential people, Dr. Stern has pushed many boundaries of science with innovative experiments and mission initiatives, including booking 8 sub-orbital spaceflights on Virgin Galactic and XCOR spaceships for space research. As Chief Scientist of Moon Express, Dr. Stern is helping the company design lunar missions that will support the company's commercial operations, leading the company's research into materials on the Moon that could have scientific and economic value for Earth and space exploration.

"We are honored to have a scientist of Alan Stern's caliber working with us," said Moon Express co-founder and CEO Dr. Robert (Bob) Richards. "Alan's unique combination of optimism, deep experience, and no-nonsense style helps propel Moon Express forward while remaining focused on the achievable."



Michael Marlaire, Director, NASA Research Park, addresses Danish CEOs on June 27, 2011 during their visit to NRP as part of Denmark's Executive Leadership program.

In Memoriam



Long time NASA and NRP friend Nobel Laureate Dr. Baruch Blumberg succumbed to a fatal heart attack during a conference at NRP on April 5, 2011 at 86 years of age.

NRP Post

Editor..... Diane Farrar
Layout and Design..... Carol Le

Phone: (650) 604-2NRP
Email: arc-dl-researchpark@mail.nasa.gov
Website: www.researchpark.arc.nasa.gov